

Amendments to the Claims:

1. (withdrawn) A downhole hammer drill including:

a drive sub or chuck mounted on an air hammer casing; and

a reverse circulation drill bit having a bit shank mounted in splined relation to said drive sub or chuck and a bit head adapted to extend below said chuck, an air hammer motor exhausting down the splines, an annular groove in said bit shank adjacent said bit head and extending to intersect the lower end of the bit shank splines, a sleeve secured to said bit shank over the lower end of said bit shank splines and substantially closing over said groove to form a manifold for exhaust air exiting said splines, an upper air passage directing sample accelerating air from said manifold up a sample recovery bore of said bit, said bit head having at least one lower air passage therethrough and intersecting said manifold, said lower air passage having a lower end directing air to a cutting face of the bit through an outlet through the side of the bit head adjacent a gauge row thereof communicating with a channel passing from said outlet to said cutting face.

2. (withdrawn) A downhole hammer drill according to claim 1, wherein said splines are milled in the bit shank, the milling tool advancing the spline toward the bit head and stopping short of the bit head to avoid the milling tool from removing bit head material.

3. (withdrawn) A downhole hammer drill according to claim 1, wherein said groove is formed by milling or turning, said groove forming a progressive change of section between the splined portion of the bit shank and the bit head to avoid stress concentration.

4. (withdrawn) A downhole hammer drill according to claim 1, wherein said sleeve has a section that substantially parallels the bottom surface of the groove to provide that said manifold is of substantially rectangular cross section.

5. (withdrawn) A downhole hammer drill according to claim 1, wherein said sleeve is adapted to cyclically open a port in a sidewall of said chuck to allow exhaust air to escape up the outside of the drill string to clear fines from the borehole.

6. (withdrawn) A downhole hammer drill according to claim 1, wherein said at least one lower air passage defined between the sample recovery bore and the side of the bit head adjacent the gauge row comprises one air passage for each carbide in the gauge row, the material of the bit head being relieved between the portions supporting the gauge row buttons to form the grooves, allowing the flushing air to pass to the face of the bit, entraining sample for recovery.

7. (withdrawn) A downhole hammer drill according to claim 1, wherein said lower air passage is formed by straight drilling at an angle to the drill bit axis from the side of the bit head adjacent the gauge row and extending to the sample recovery bore above the bit head, whereby a single drilling provides both the lower air passage and the upper air passage.

8. (currently amended) A downhole hammer drill including:

a drive sub or chuck mounted on an air hammer drill casing; and

a reverse circulation drill bit having a bit shank mounted in splined relation to said drive sub or chuck and a bit head adapted to extend below said drive sub or chuck, an air hammer motor in the air hammer drill casing exhausting down the splines, a plurality of upper air passages each opening from a spline in the region of the bit head and each inclined toward the axis of the bit and extending along the bit shank away from said bit head to intersect a sample recovery bore of said bit, said

upper air passages directing being configured to direct substantially all of the sample
accelerating air from the said openings from a spline up the sample recovery bore
~~the sample recovery bore of said bit.~~

9. (Original) A downhole hammer drill according to claim 8, wherein spline-borne exhaust air is also directed through the bit head by at least one lower air passage therethrough.

10. (Original) A downhole hammer drill according to claim 9, wherein said at least one lower air passage has a lower end directing air to the cutting face of the bit through an outlet through the side of the bit head adjacent a gauge row thereof and communicating with a channel passing from the outlet to the cutting face.

11. (currently amended) A downhole hammer drill according to claim 10, wherein said at least one lower air passage is ~~formed as a continuation of the drilling of~~ each of the upper air passages.

12. (Original) A downhole hammer drill according to claim 11, wherein each said upper air passage and lower air passage are co-formed by a drilling from the gauge row at the location of the button, through the bit head and into the shank, to intersect the sample recovery bore.

13. (Original) A downhole hammer drill according to claim 8, wherein each said upper air passage is formed by a drilling from the position of a gauge row at the location of a carbide button, through the bit head and into the shank, to intersect the sample recovery bore, and wherein said drilling is counter bored at its lower end to form the carbide button mounting socket.

14. (previously presented) A downhole hammer drill according to claim 8, further comprising a dynamic air seal to a borehole formed by the downhole hammer drill in use.

15. (currently amended) A downhole hammer drill including:

a drive sub or chuck mounted on an air hammer drill casing; and

a reverse circulation drill bit having a bit shank mounted in splined relation to said drive sub or chuck and a bit head adapted to extend below said chuck, an air hammer motor exhausting down the splines, an exhaust air passage formed in said bit shank adjacent said bit head and adapted to receive air exhausted at the lower end of the bit shank splines, an upper air passage opening from said exhaust air passage in the region of the bit head and inclined toward the axis of the bit and extending along the bit shank away from said bit head to intersect a sample recovery bore of said bit, said upper air passage being configured to direct substantially all of the sample accelerating air from the said exhaust air passage up the sample recovery bore ~~an upper air passage intersecting said exhaust air passage and directing sample accelerating air from said exhaust air passage up a sample recovery bore of said bit~~, said bit head having at least one lower air passage therethrough and intersecting said exhaust air passage, said lower air passage having a lower end directing air to the cutting face of the bit through an outlet through the side of the bit head adjacent a gauge row thereof communicating with a channel passing from said outlet to said cutting face.

16. (previously presented) A downhole hammer drill according to claim 15, further comprising a dynamic air seal to a borehole formed by the downhole hammer drill in use.

17. (previously presented) A downhole hammer according to claim 8, wherein said upper air passages each open from a spline in the region of the bit head via an exhaust air passage formed in said bit shank adjacent said bit head.

18. (previously presented) A downhole hammer drill according to claim 17, wherein spline-borne exhaust air is also directed from the exhaust air passage through the bit head by at least one lower air passage.